



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Joseph B. Cross, Glenn W. Dodwell,
Ed L. Sughrue and Marvin M. Johnson

Serial No.: 10/735,557

Group Art Unit: 1754

Filed: December 12, 2003

Examiner: Edward M. Johnson

For: **PROCESS FOR THE REMOVAL OF HEAVY METALS FROM GASES,
AND COMPOSITIONS THEREFOR AND THEREWITH**

APPELLANT'S BRIEF ON APPEAL

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Real Party of Interest

ConocoPhillips Company is the assignee of record of the above-captioned application and, thus, is the real party of interest in this appeal.

Related Appeals and Interferences

It is believed that there are no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board decision in this appeal.

Status of claims

Appellant's appeal the final rejection of pending claims 1 – 16. Claims 17 – 103 have been withdrawn from consideration.



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APPEAL BRIEF FEE LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an Appeal Brief in the above-identified application.

Please charge the Appeal Fee of \$500.00 to Deposit Account No. 16-1575. The
Commissioner is hereby authorized to charge any additional fees which may be required under 37 CFR 1.16 or
37 CFR 1.17, or credit any overpayment, to Deposit Account 16-1575, but is not authorized to charge any fee
provided for under 37 CFR 1.18.

Respectfully submitted,

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IP LEGAL

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the
United States Postal Service as first class mail in an envelope addressed
to: Commissioner for Patents, Alexandria, VA 22313-1450, on

June 28, 2006

June 28, 2006

Jeffrey R. Anderson
Jeffrey R. Anderson

Status of Amendments

A final office action was mailed on December 14, 2005, wherein the Examiner finally rejected claims 1 – 16. A Response to the final office action was mailed on March 13, 2006 requesting reconsideration of the Examiner's final rejection. No amendments to claims 1 – 16 were proposed in the Response. The Examiner maintained the final rejection of claims 1 – 16 in an Advisory Action mailed March 29, 2006. A Notice of Appeal was mailed on June 6, 2006.

Summary of Claimed Subject Matter

Independent claims 1, 5 and 6, and claims 2 – 4 depending from claim 1, relate to a composition which comprises, consists essentially of, or consists of a support and vanadium. See Page 4, lines 1 – 2. The support is selected from the group consisting of: 1) amorphous silica-alumina; 2) a zeolite; 3) a material comprising alumina, expanded perlite and meta-kaolin; 4) alumina; and 5) combinations thereof. See Page 4, lines 3 – 5. In addition, at least a portion of the vanadium of the composition has a crystallite size less than about 100 Å. See Page 4, lines 13 – 19.

Claims 7 - 16.

The composition of claim 7, and that of claims 8 – 16 depending therefrom, comprises vanadium and a support, as discussed for claim 1, which is heated in the presence of oxygen in a solvent to a calcination temperature. The calcination temperature is preferably sufficient to volatilize and remove substantially all of the solvent and is also preferably below the temperature which would result in the conversion of greater than about

90 wt. percent of the vanadium to vanadium-and-oxygen-containing crystallites greater than about 100Å in size. See paragraph bridging pages 4 and 5.

Grounds of Rejection to be Reviewed on Appeal

Whether claims 1 – 6 are unpatentable under 35 U.S.C. 102 (b) as being anticipated by Kepner et al. (U.S. Patent 6,342,191 B1).

Whether claims 7 – 16 are unpatentable under 35 U.S.C. 103 (a) as obvious over Kepner et al. (U.S. Patent 6,342,191 B1).

Argument

Rejection under 35 U.S.C. 102 (b) over Kepner et al., U.S. Patent 6,342,191.

Claims 1 – 6.

Kepner discloses a process for producing an enhanced adsorbent particle comprising contacting a non-ceramic, porous, oxide adsorbent particle with an acid for a sufficient time to increase the adsorbent properties of the particle. See Kepner, Col. 8, lines 36 – 40. The Kepner inventors believed that the acid contacting of the particle enhances the adsorptive capacity of the particle by increasing the number of hydroxyl groups on the particle. See Kepner, Col. 9, lines 9 – 12. Preferred adsorbent particles disclosed by Kepner include aluminum oxide, silicon dioxide and vanadium pentoxide. See Kepner, Col. 10, lines 14 – 19.

Kepner also discloses that, in a preferred embodiment, the particle is microporous, even more preferably substantially microporous, having a median micropore size preferably of from 3.5 nm to 35 nm (35 Å to 350 Å) diameter. See

Kepner, Col. 10, lines 19 - 22. Kepner discloses that each particle is contacted with an acid and that the length of time the particle must be contacted with the acid varies according to the ability of the particular particle to generate hydroxyl groups on the surface and pores of the particle. See Kepner, Col. 12, lines 28 - 35. Kepner further discloses that the composition can comprise an aluminum oxide particle and a co-particle which can be vanadium pentoxide or a zeolite. See Kepner, Col. 14, lines 35 - 47. Kepner also discloses that, preferably, the composition is held together using a colloidal alumina binder that has been crosslinked. See Kepner, Col. 14, lines 62 - 63. Kepner discloses that the crosslinking temperature, and thus the heating step, is from 50° C, 70°C, 110°C, or 150°C to 200°C, 250° C, 300°C or 350° C. See Kepner Col. 22, lines 6 - 9. Kepner also distinguishes cross-linking from calcining. Kepner states that while calcining removes any residual water that may be on the particle as well as change the lattice structure of the particle to form a crystalline particle, it also removes the hydroxyl groups on the binder that are required for crosslinking. Therefore, according to Kepner, heating the system during or after the crosslinking step to a temperature above the cross-linking temperature into the particle or binder calcining temperature range or above is detrimental to the system. Kepner goes on to state that "Thus, prior art systems, where mixtures of colloidal alumina and/or colloidal silica are (1) calcined or recalcined or (2) heated to form a refractory material are not part of this invention." See Kepner, Col. 22, lines 19 - 44. Kepner also discloses that the size and shape of the particles used in their invention prior to extruding can vary greatly depending on the end use, and that typically, for adsorption or catalytic applications, a small particle size such

as 5 μm or greater to about 250 μm are preferable because they provide a larger surface area than large particles. See Kepner, Col. 23, lines 15 – 20.

Appellants point out that the Kepner reference does not disclose a composition comprising, consisting of, or consisting essentially of vanadium and a support selected from the group consisting of: 1) amorphous silica-alumina; 2) a zeolite; 3) a material comprising meta-kaolin, alumina and expanded perlite; 4) alumina; and 5) combinations thereof, but instead discloses separate adsorbent particles which can be either vanadium pentoxide, aluminum oxide or a zeolite, among other particles. Kepner does not disclose the use of either alumina or a zeolite as a support for vanadium. In fact, rather than supporting vanadium on a support, Kepner combines vanadium pentoxide, aluminum oxide or zeolite particles by use of a colloidal binder, with each of the separate particles being treated with an acid in order to increase their adsorptive functionality by generating hydroxyl groups on the surface and pores of each particle. This is clearly not the same as a composition comprising vanadium and a support. Further on this point, the restrictions regarding the heating temperature in Kepner are based on avoiding the removal of hydroxyl groups needed for cross-linking the various particles together.

Appellants also point out that Kepner does not disclose that the vanadium in the final composition has a particle size of 35 Å, but rather discloses that the particles, which includes the vanadium pentoxide, have a **median micropore size** which is preferably from 35Å to 350Å in diameter. Kepner does disclose that the **minimum particle size** for each of the particles including the aluminum oxide,

vanadium pentoxide, and zeolite, is 5 μm which is equivalent to 50,000Å. Thus, Appellants point out that the Kepner reference does not disclose that at least a portion of said vanadium has crystallite sizes of less than about 100 Å. In fact, as stated above, the vanadium pentoxide of Kepner is in the form of particles having a minimum particle size of 50,000Å (5 μm) up to about 2,500,000 (250 μm), certainly not less than about 100Å which is a limitation in claim 1 of the instant application.

Thus, Appellants submit that independent claim 1 and each of the claims depending variously therefrom, and independent claims 5 and 6 are patentably distinguishable over the Kepner reference.

Rejection under 35 U.S.C. 103 (a) as obvious over Kepner et al. (U.S. Patent 6,342,191).

Claims 7 – 16.

As stated above, Appellants point out that the Kepner reference does not disclose vanadium having a particle size of 35Å, but rather a minimum particle size of 50,000Å. Again, the intent of the Kepner reference is to bind two or more particles together using a binder, wherein each particle has been separately treated with an acid in order to increase the adsorptive capacity by generating hydroxyl groups on the surface and pores of such particles. Kepner clearly does not disclose a vanadium supported by alumina or a zeolite, anymore than it discloses alumina or zeolite supported on vanadium, but does disclose the binding together of particles such as vanadium pentoxide, aluminum oxide, or a zeolite having minimum particle sizes of 50,000Å using a collidial binder.

Appellants submit that the Kepner reference does not disclose the limitations of claim 7 of the instant application that the composition comprises vanadium and a support and that said calcination temperature is below the temperature which would result in the conversion of greater than about 90 weight percent of the vanadium to vanadium-and-oxygen-containing crystallites greater than about 100Å in size. In fact, as stated above, Kepner discloses a **minimum** particle size for the vanadium pentoxide, aluminum oxide or a zeolite, among other particles, of 5µm (50,000Å). In addition, Appellants were unable to find, and the Examiner has not pointed out, the limitation in independent claim 7 that the inventive composition is heated in the presence of oxygen and a solvent to a calcination temperature.

Thus, Appellants submit that independent claim 7 and all of the claims depending variously therefrom are patentably distinguishable over the Kepner reference.

Response to Examiner's "Response to Arguments" in the Final Office Action

Appellants are unclear as to the meaning of the Examiner's statement in the final office action that Appellants' argument that "Kepner discloses a process for producing an enhanced adsorbent particle comprising contacting a non-ceramic, porous, oxide adsorbent particle with an acid for a sufficient time to increase the adsorbent properties of the particle" is not persuasive. Appellants point out that this is a direct reference taken from Kepner at Col. 8, lines 36 – 40.

In the final office action, the Examiner stated that Appellants' argument that "Kepner does not disclose the claimed limitations of claim 1, but instead discloses separate adsorbent particles which can be either vanadium pentoxide, aluminum oxide

or a zeolite, among other particles,” is not persuasive.

Appellants point out that Kepner discloses the use of non-ceramic, porous, oxide adsorbent particles (See Kepner, Col. 8, lines 36 – 40), that such particles preferably include aluminum oxide, silicon dioxide and vanadium pentoxide (See Kepner, Col. 10, lines 14 – 19), and that small particle sizes such as 5 μ m or greater to about 250 μ m are preferable. Thus, Appellants fail to see how the statement that “Kepner discloses separate adsorbent particles which can be either vanadium pentoxide, aluminum oxide or a zeolite, among other particles” is not persuasive to the Examiner, as it is clearly taken directly from the Kepner reference. Clearly, Kepner does not disclose a composition comprising vanadium and a support material.

Regarding the Examiner’s statement in the final office action that “Applicant appears to admit that 35 Angstroms, which is less than 100 Angstroms, is disclosed” is not correct. Appellants in fact point out that Kepner discloses a range for particle size (including vanadium pentoxide) of from 50,000Å up to about 2,500,000Å, not less than 100Å. The Examiner has incorrectly concluded that the reference in Kepner at Col. 10, lines 19 – 22 that the particles (including the vanadium pentoxide) are “preferably substantially microporous, having a median micropore size preferably of from 3.5 nm to 35 nm (35Å to 350Å) diameter” means that the particle sizes in Kepner are 35Å to 350Å. Appellants point out that the median micropore size diameter is the diameter of the micropore void spaces within the particle, while the particle size diameter is the diameter of the whole particle itself.

**Further Detailed Arguments Regarding the Examiner's Statements in the
Advisory Action**

In the Advisory Action mailed on March 29, 2006 the Examiner brings up a new argument from within the Kepner et al., U.S. Patent No. 6,342,191 reference taken from column 19, lines 51 – 57. The Examiner states that “Kepner discloses individual component sizes as small as 5 nm... and that they can be “the same” as component b, which includes crystalline vanadium, which would inherently correspond to vanadium having a size small as 5 nm”. Contrary to the Examiner's assertions, Appellants point out that the Kepner reference does not disclose a composition containing a vanadium having crystallite sizes less than 100 Å in diameter. In fact, what the Examiner relies on to provide such limitation is that the binder material used to bind the catalysts particles together can be as small as 5 nm (50 Å). However, Kepner is clear that the binder is a colloidal metal which must have a substantial number of hydroxyl groups to enable the binder material to crosslink both with itself and with a catalyst particle in order to form the desired composition. Thus, after such cross-linking, the “binder” material of Kepner will not necessarily, and is actually not at all likely to, remain 5 nanometer particles.

In addition, the 5 nanometer binder size is only discussed with regard specifically to colloidal alumina and colloidal silica and not at all with regard to vanadium oxides. Thus, Kepner does not specifically disclose the use of a vanadium oxide binder starting material with a 5 nm binder size for use in producing the composition disclosed in Kepner. In addition, Appellants point out that even if the Examiner were correct the 5 nm size also applied to the vanadium oxide binder, the size limitations given in Kepner are

clearly for the binder used as a feed to the process of making the composition. Given that Kepner requires the binder to be cross-linked with both itself and the other particles, the size of the colloidal metal binder will not remain at the 5 nm range. Clearly, the limitation present in each of claims 1 – 16, that at least a portion of the vanadium present in the composition has crystallite sizes of less than 100 Å, is not disclosed by the Kepner reference.

In view of the remarks above it is respectfully suggested that claims 1 – 16 are patentable over the prior art. Reversal of the final rejection of claims 1 -16 is respectfully requested.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Alexandria, VA 22313-1450 on

June 28, 2006

(Date)

Jeffrey R. Anderson
Jeffrey R. Anderson

Claims Appendix

1. (original) A composition comprising vanadium and a support selected from the group consisting of: 1) amorphous silica-alumina; 2) a zeolite; 3) a material comprising meta-kaolin, alumina, and expanded perlite; 4) alumina; and 5) combinations thereof, wherein at least a portion of said vanadium has crystallite sizes of less than about 100 Å as determined by an analytical method such as X-Ray Diffraction.
2. (original) A composition in accordance with claim 1 wherein said vanadium is present in said composition, on an elemental vanadium basis, in an amount in the range of from about 0.5 to about 50 wt. percent, based on the total weight of said composition.
3. (original) A composition in accordance with claim 1 wherein said vanadium is present in said composition, on an elemental vanadium basis, in an amount in the range of from about 1 to about 20 wt. percent, based on the total weight of said composition.
4. (original) A composition in accordance with claim 1 wherein said vanadium is present in said composition, on an elemental vanadium basis, in an amount in the range of from about 1.5 to about 15 wt. percent, based on the total weight of said composition.
5. (original) A composition consisting essentially of vanadium and a support selected from the group consisting of: 1) amorphous silica-alumina; 2) a zeolite; 3) a material comprising meta-kaolin, alumina, and expanded perlite; 4) alumina; and 5) combinations thereof, wherein at least a portion of said vanadium has

crystallite sizes of less than about 100 Å as determined by an analytical method such as X-Ray Diffraction.

6. (original) A composition consisting of vanadium and a support selected from the group consisting of: 1) amorphous silica-alumina; 2) a zeolite; 3) a material comprising meta-kaolin, alumina, and expanded perlite; 4) alumina; and 5) combinations thereof, wherein at least a portion of said vanadium has crystallite sizes of less than about 100 Å as determined by an analytical method such as X-Ray Diffraction.

7. (original) A composition comprising vanadium and a support selected from the group consisting of: 1) amorphous silica-alumina; 2) a zeolite; 3) a material comprising meta-kaolin, alumina, and expanded perlite; 4) alumina; and 5) combinations thereof, heated in the presence of oxygen and a solvent to a calcination temperature; wherein said calcination temperature is sufficient to volatilize and remove substantially all of the solvent; and wherein said calcination temperature is below the temperature which would result in the conversion of greater than about 90 weight percent of the vanadium to vanadium-and-oxygen-containing crystallites greater than about 100Å in size.

8. (original) A composition in accordance with claim 7 wherein said solvent is an aqueous solution of oxalic acid.

9. (original) A composition in accordance with claim 7 wherein said composition is heated for a time period in the range of from about 0.1 to about 24 hours.

10. (original) A composition in accordance with claim 7 wherein said composition is heated for a time period in the range of from about 1 to about 4 hours.

11. (original) A composition in accordance with claim 7 wherein said vanadium is present in said composition, on elemental vanadium basis, in an amount in the range of from about 0.5 to about 50 wt. percent, based on the total weight of said composition.

12. (original) A composition in accordance with claim 7 wherein said vanadium is present in said composition, on elemental vanadium basis, in an amount in the range of from about 1.0 to about 20 wt. percent, based on the total weight of said composition.

13. (original) A composition in accordance with claim 7 wherein said vanadium is present in said composition, on elemental vanadium basis, in an amount in the range of from about 1.5 to about 15 wt. percent, based on the total weight of said composition.

14. (original) A composition in accordance with claim 7 wherein said calcination temperature is below about 400°C.

15. (original) A composition in accordance with claim 7 wherein said calcination temperature is above about 125°C and wherein said calcination temperature is below about 375°C.

16. (original) A composition in accordance with claim 7 wherein said calcination temperature is above about 150°C and wherein said calcination temperature is below about 350°C.

Evidence Appendix

None

Related Proceedings Appendix

None